Meeting the Future Demand for Aquatic Food: the Role of Aquaculture

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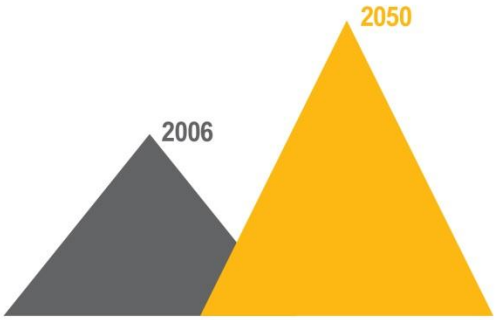
THE GREAT BALANCING ACT

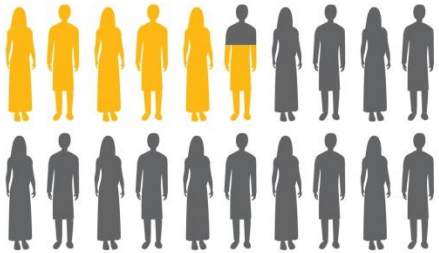
The world must achieve a "great balancing act" in order to sustainably feed 9 billion people by 2050.
Three needs must be met at the same time.

CLOSING THE FOOD GAP



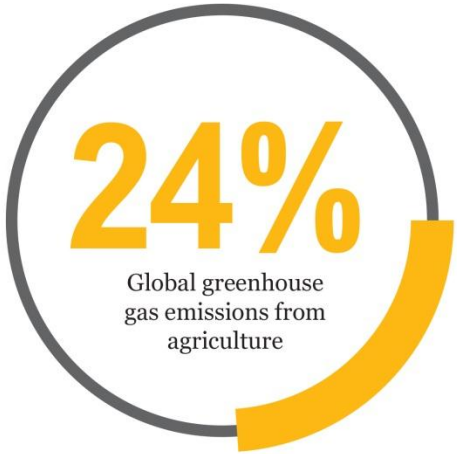
60% Required increase in food calories to feed 9 billion people by 2050

SUPPORTING ECONOMIC DEVELOPMENT



28% Global population directly or indirectly employed by agriculture

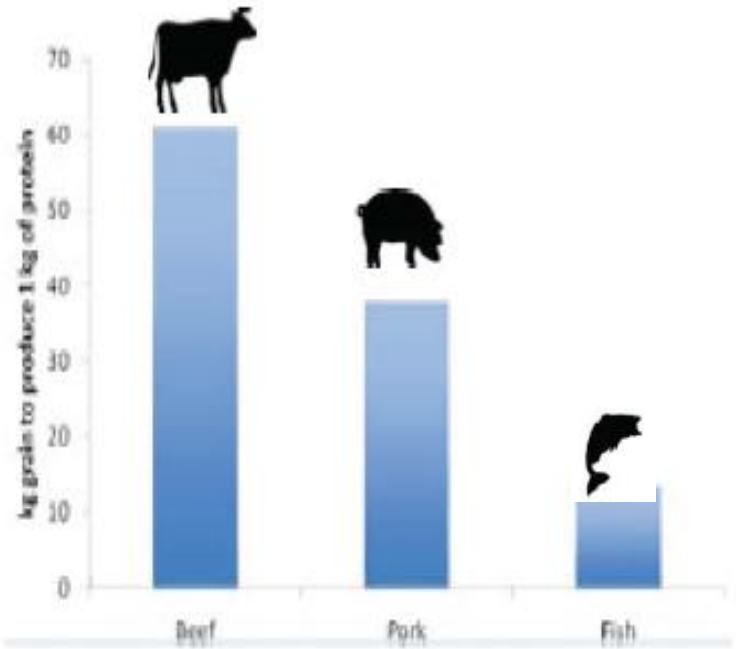
REDUCING ENVIRONMENTAL IMPACT



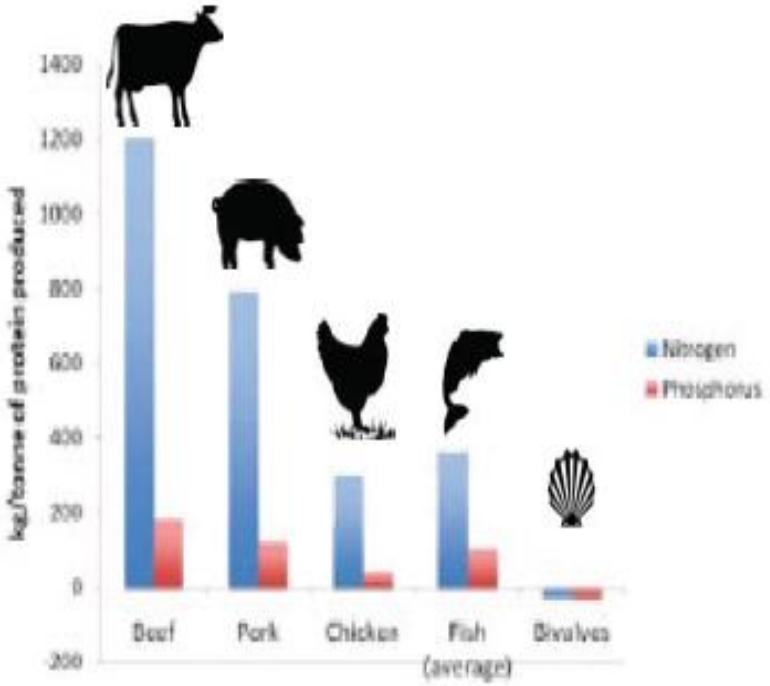
WORLD RESOURCES INSTITUTE


Animal Sourced Food

Farmed Aquatics vs. Other Animal Source Foods



Conversion Efficiency



Emissions

Comparison of Sustainability Indicators

	FCR (kg/kg)	Protein Efficiency %	N emission (kg/t)	P emission (kg/t)	Land (t/ha)	Freshwater Use (m3/t)
Beef	31.7	5	1.200	180	0.24-0.37	15,497
Chicken	4.2	25	300	40	1.0-1.2	3.918
Pork	10.7	13	800	120	0.83-1.10	4,856
Finfish	2.3	30	360	48	0.15-3.70	5,000
Bivalves	not fed	not fed	-27	-29	0.28-20.0	0

World Bank, 2013

Role of Aquatic Food

- Aquatic food refers to food derived from aquatic resources, originating from marine, brackishwater and freshwater environments, including mainly fish, crustaceans and molluscs.

Net exports of selected agricultural commodities by developing countries

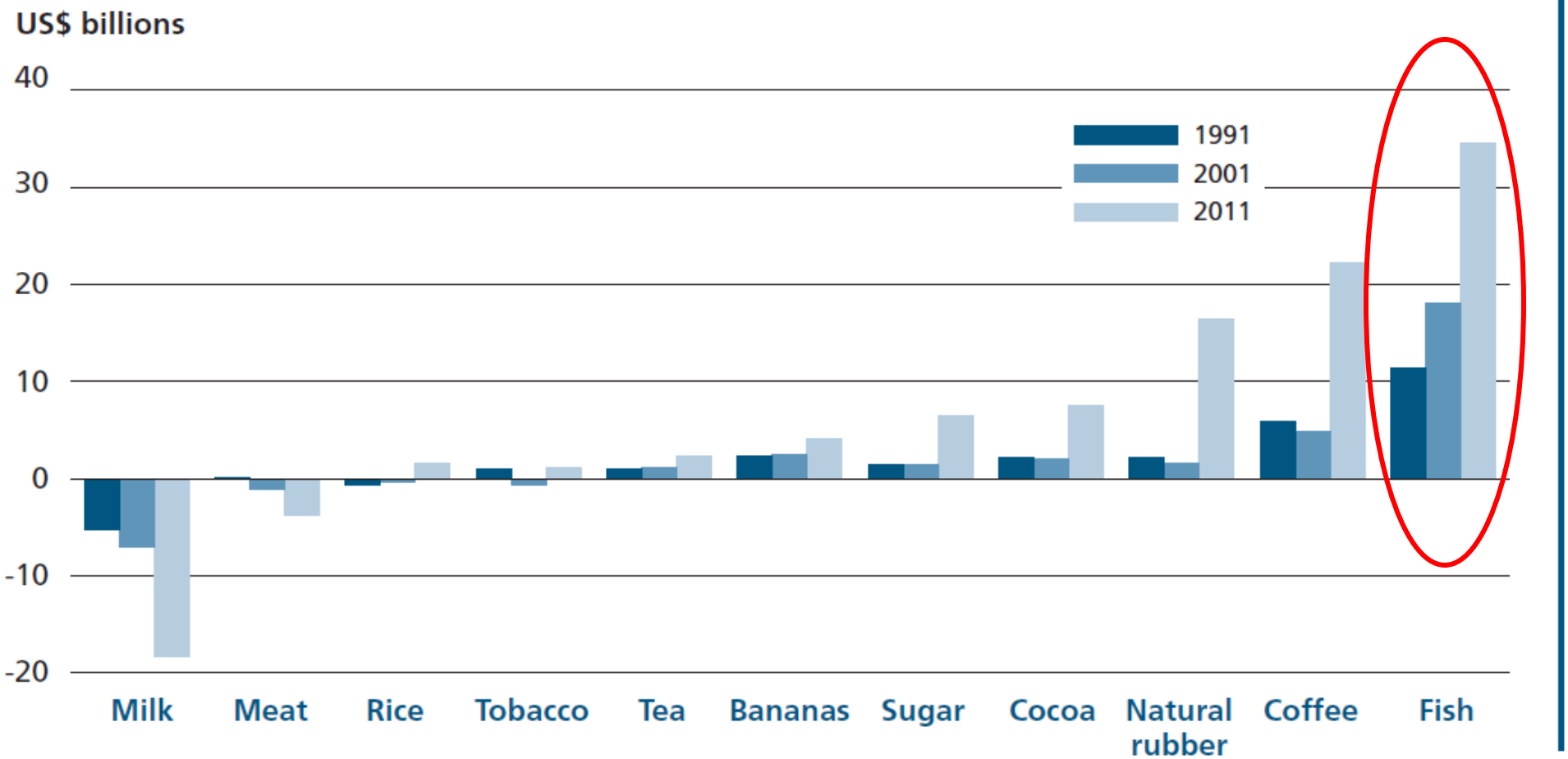


Table 10
World fishers and fish farmers by region

	1995	2000	2005	2010	2011	2012
			(Thousands)			
Africa	2 392	4 175	4 430	5 027	5 250	5 885
Asia	31 296	39 646	43 926	49 345	48 926	49 040
Europe	530	[illegible]	705	662	656	647
Latin America and the Caribbean	[illegible]	[illegible]	[illegible]	[illegible]185	2 231	2 251
North Ameri[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	324	323
Oceania	[illegible]	[illegible]	[illegible]	[illegible]28	[illegible]	[illegible]
World	[illegible]	[illegible]	[illegible]	[illegible]4	[illegible]	**58 272**
Of which						
Africa	[illegible]	[illegible]	[illegible]	[illegible]	257	298
Asia	[illegible]	[illegible]	[illegible]	[illegible]	18 373	18 175
Europe	[illegible]	[illegible]	[illegible]	[illegible]	103	103
Latin America and the Caribbean	[illegible]	[illegible]	[illegible]	248	265	269
North America	6	6	10	9	9	9
Oceania	4	5	5	5	6	6
World	**8 049**	**12 632**	**15 115**	**18 512**	**19 015**	**18 861**

36 million
along the value chain!

Micronutrient Deficiency

- > 250 million children worldwide are at risk of vitamin A deficiency
- > 200 million people have goiter (with 20 million have learning difficulties as a result of iodine deficiency)
- > 2 billion people (more than 30 percent of the world's population) are iron deficient
- > 800 000 child deaths per year are attributable to zinc deficiency

Fish and Nutrition

- A source of the long-chain omega-3 fatty acids
  - Eicosapentaenoic acid (EPA)
  - Docosahexaenoic acid (DHA)
- Important for optimal brain and neural system development in children (1000 day window!)

Fish and Nutrition

- Lowers the risk of coronary heart disease (CHD) mortality.
- A daily intake of 250 mg of EPA and DHA per adult gives optimal protection against CHD.
- Two “fish meals” a week!
- WHO - 15kg/capita/year

Fish Consumption

- About 17 percent of the global population's intake of animal protein is fish, but with a significant range:
- Although African average is very low:
  - 44% - Senegal
  - 49% - Gambia
  - 51% - Ghana
  - 70% - Sierra Leone

Fish Consumption

- Asian average is high with:
  - 54% - Indonesia
  - 56% - Bangladesh
  - 57% - Sri Lanka
  - 65% - Cambodia
  - 71% - Maldives.

Small fish vs. Big fish

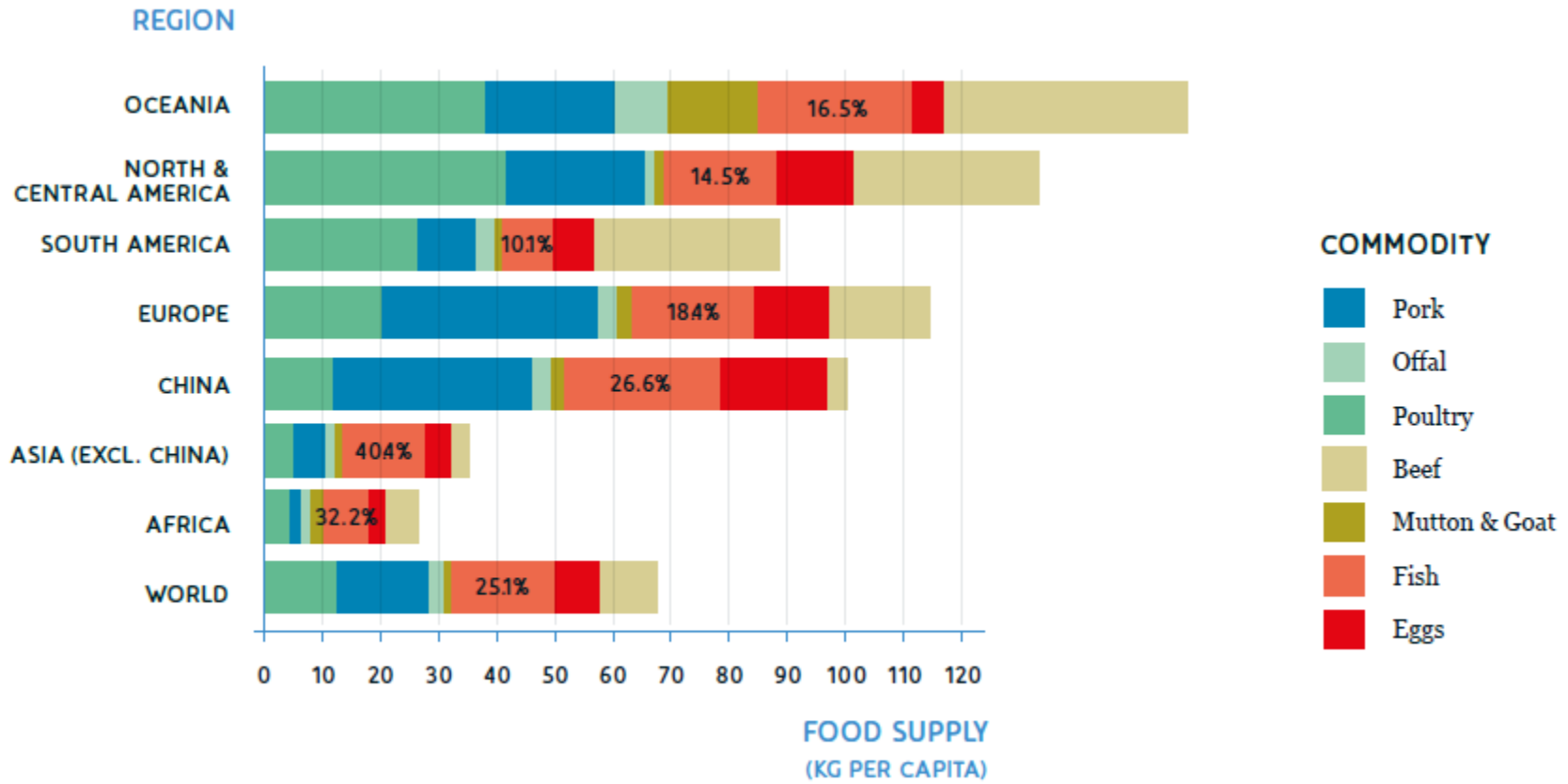
Small-fish and Nutrition

Recipe for Nutrition!

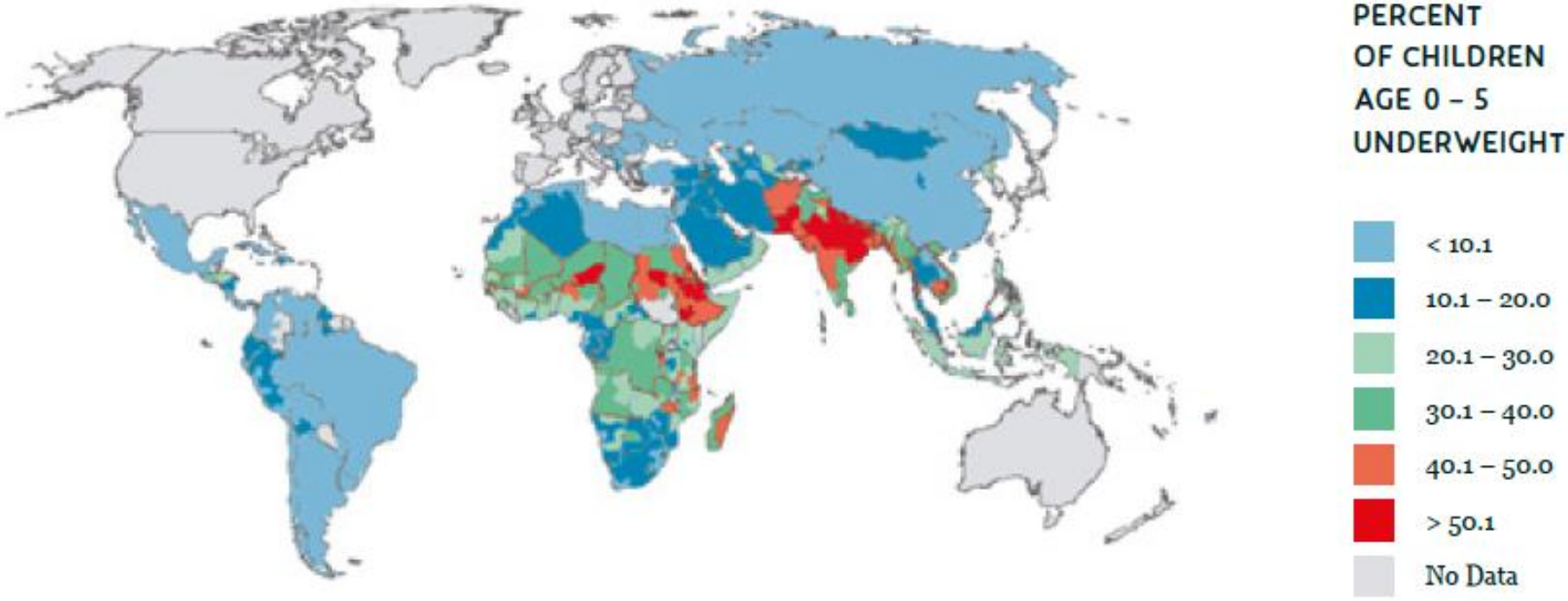
- 15% dried darkina fish
- 30% sweet potato flour
- 10% soybean oil
- 45% rice flour

Energy	Protein	Fat	Iron	Zinc	Calcium	Vit A
422 kcal	16 g	12 g	12 mg	6 mg	660 mg	348 µg

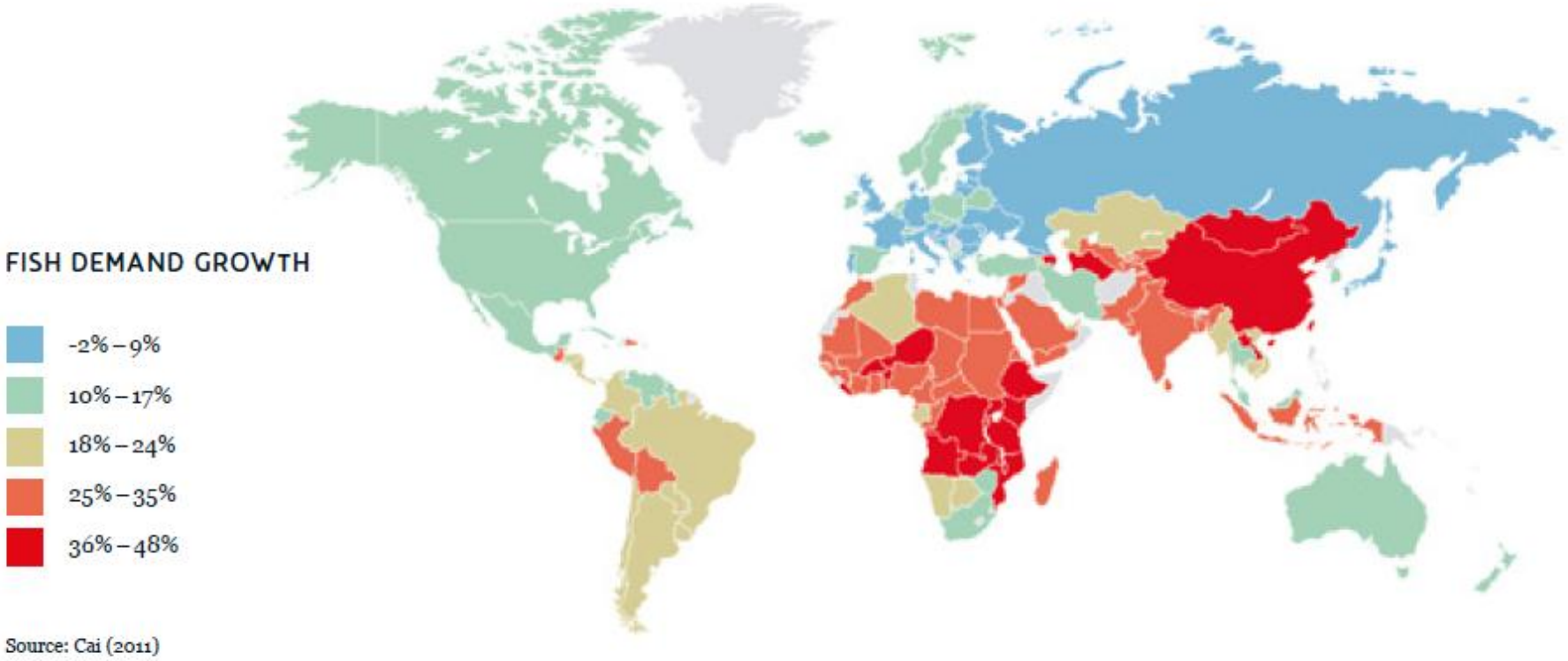
Animal Sourced Food Consumption by Region



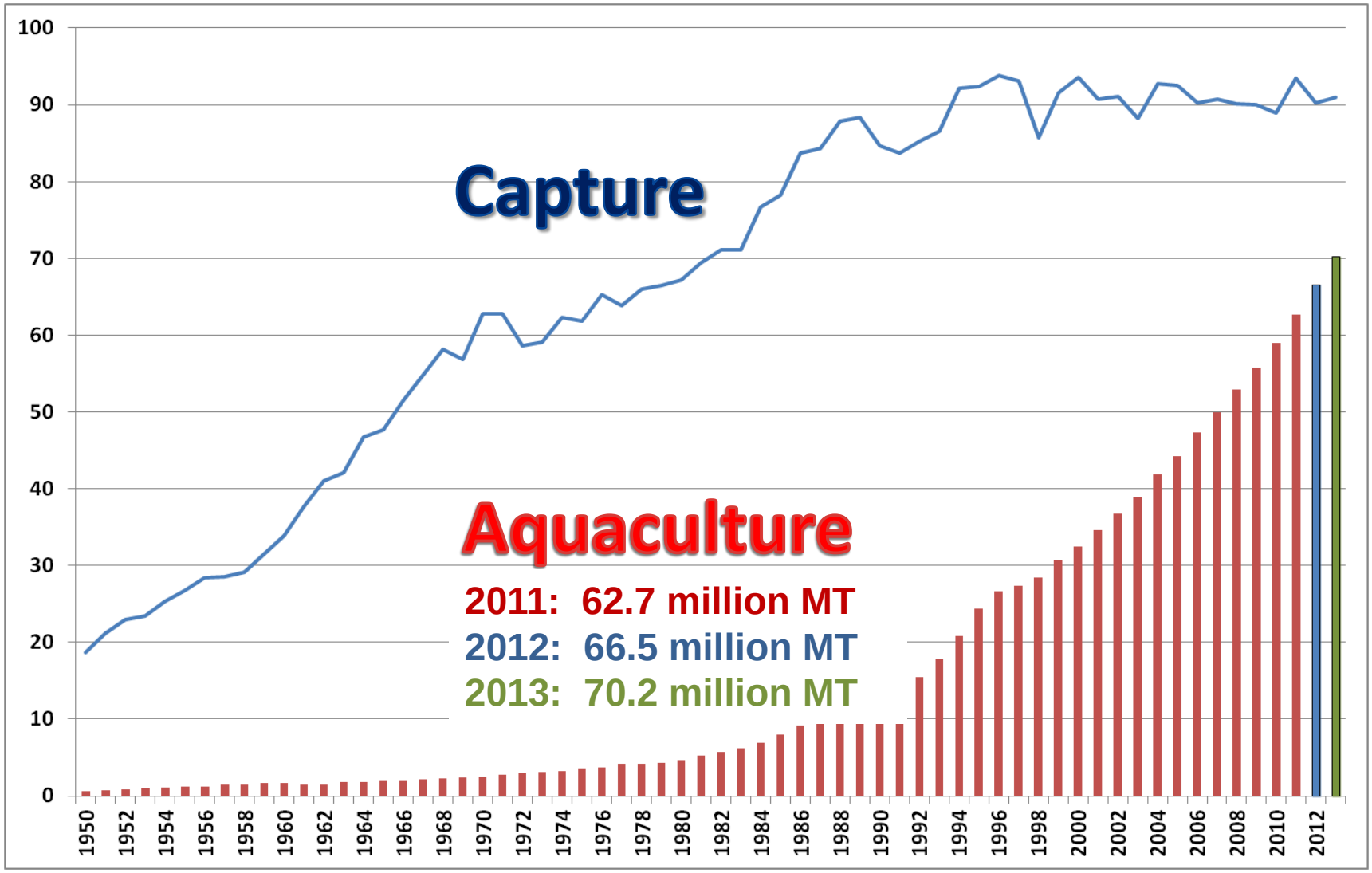
Child Stunting - 2007



Growth in Overall Requirements for Fish



World Fish Production



World aquaculture production 2013

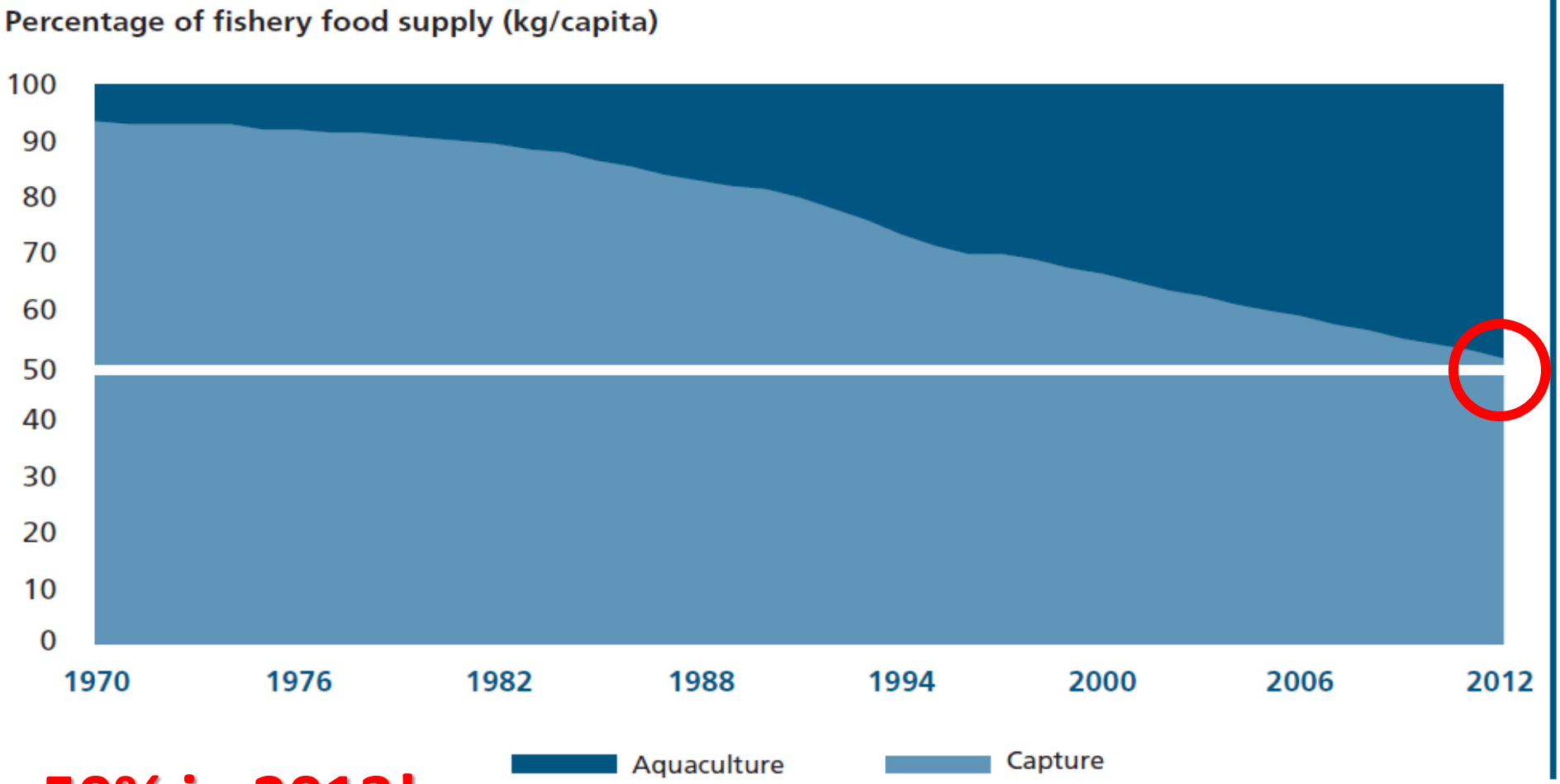
	Inland	Marine	Sub-total
Fin fish	41 292	5 778	47 071
Crustacean	2 584	4 128	6 712
Molluscs	283	15 231	15 514
Other animals	525	368	893
Food fish total	44 685	25 505	**70 190**
Aquatic algae	82	26 896	**26 978**
Total	**44 767**	**52 401**	**97 168**

Top 10 Producers - 2013

Fin fish - inland		
China	24 817 311	60.1%
India	4 148 407	10.0%
Indonesia	2 459 418	6.0%
Viet Nam	2 369 903	5.7%
Bangladesh	1 647 827	4.0%
Egypt	1 091 688	2.6%
Myanmar	869 384	2.1%
Thailand	467 249	1.1%
Brazil	388 700	0.9%
Philippines	318 798	0.8%
Others	2 713 481	6.6%
WORLD	41 292 167	100%

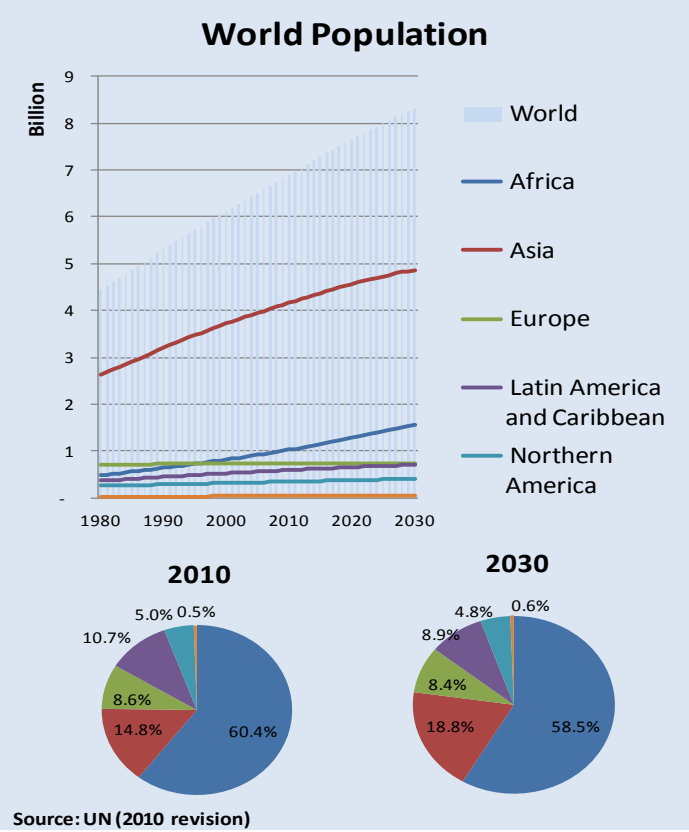
Fin fish - marine		
Norway	1 245 399	21.6%
China	1 123 576	19.4%
Chile	736 310	12.7%
Indonesia	720 545	12.5%
Philippines	375 735	6.5%
Japan	242 905	4.2%
UK	156 220	2.7%
Greece	124 740	2.2%
Canada	122 024	2.1%
Turkey	110 845	1.9%
Others	820 088	14.2%
WORLD	5 778 387	100%

Relative contribution of aquaculture and capture fisheries to food fish consumption



50% in 2013!

Fish requirement driven by population growth

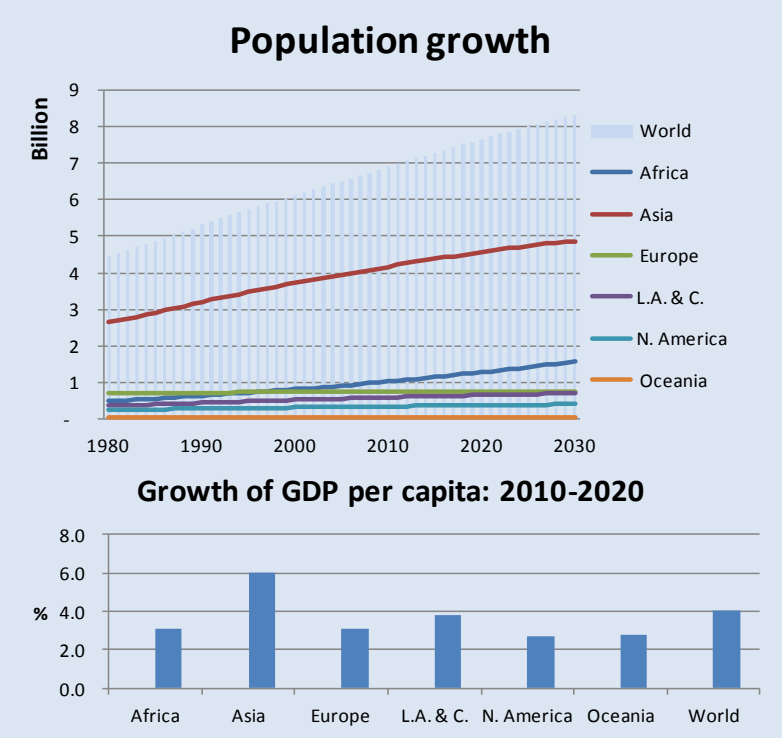


Fish Demand (mt)	2007 (baseline)	2030 (projection)
Africa	9.0	14.0
Asia	86.4	96.3
Europe	19.4	19.9
L.A. & C.	15.2	16.4
Northern A.	9.1	10.7
Oceania	1.1	1.4
World	**140.3**	**158.8**

Source: Estimation of FI Department

- To maintain baseline consumption in every country, 159 million tonnes of fish needed to feed world population in 2030.
- Total supply (211 mt) > Total demand (159 mt)

Fish requirement driven by population and income growth



Fish Demand (mt)	2007 (baseline)	2030 (projection)
Africa	9.0	18.7
Asia	86.4	186.3
Europe	19.4	23.4
L.A. & C.	15.2	18.3
Northern A.	9.1	12.9
Oceania	1.1	1.8
World	**140.3**	**261.2**

Source: Estimation of FI Department

Fish supply-requirement gaps

Region	Supply 2030	Requirement 2030	S-R gap 2030
Africa	11.7	18.7	-7.0
Asia	156.5	186.3	-29.8
Europe	18.6	23.4	-4.8
L.A. & C.	16.2	18.3	-2.1
Northern A.	6.2	12.9	-6.6
Oceania	1.5	1.8	-0.3
World	**210.7**	**261.2**	**-50.6**

Source: Estimation of FI Department

Bridging the Gap

- Improved and better managed fisheries
- **Sustaining (increasing!) aquaculture growth**
- Reducing fish waste
- Addressing climate change

Sustaining Aquaculture Growth

Aquaculture growth rate during 2007-2030	Expected APR (%)	Required APR (%)
World	**4.0**	**5.6**
Africa	7.2	11.5
Asia	4.0	5.3
Europe	3.1	4.0
L.A. & C.	4.4	7.6
Northern A.	0.4	9.0
Oceania	2.6	7.9

Source: Estimation of FI Department

- If countries aquaculture production follow the recent trend, expected aquaculture growth rate:
  - 4.0 percent annually.
- To feed growing and wealthier world population, required aquaculture growth rate:
  - 5.6 percent annually.

Sustaining Aquaculture Growth

If not?

…… In particular, per capita fish consumption in ***Sub-Saharan Africa*** is projected to decline at an annual rate of 1 percent to 5.6 kilograms during the 2010–30 period.

Source: Fish to 2030. World Bank 2014

9.4kg – 2010

5.6kg – 2030

Acceptable?

Sustaining Aquaculture Growth

- **There are many issues, challenges and opportunities:**
  - Policy and governance
  - Technology and innovations
  - Investment and finance
  - Improved Public-Private-Partnership

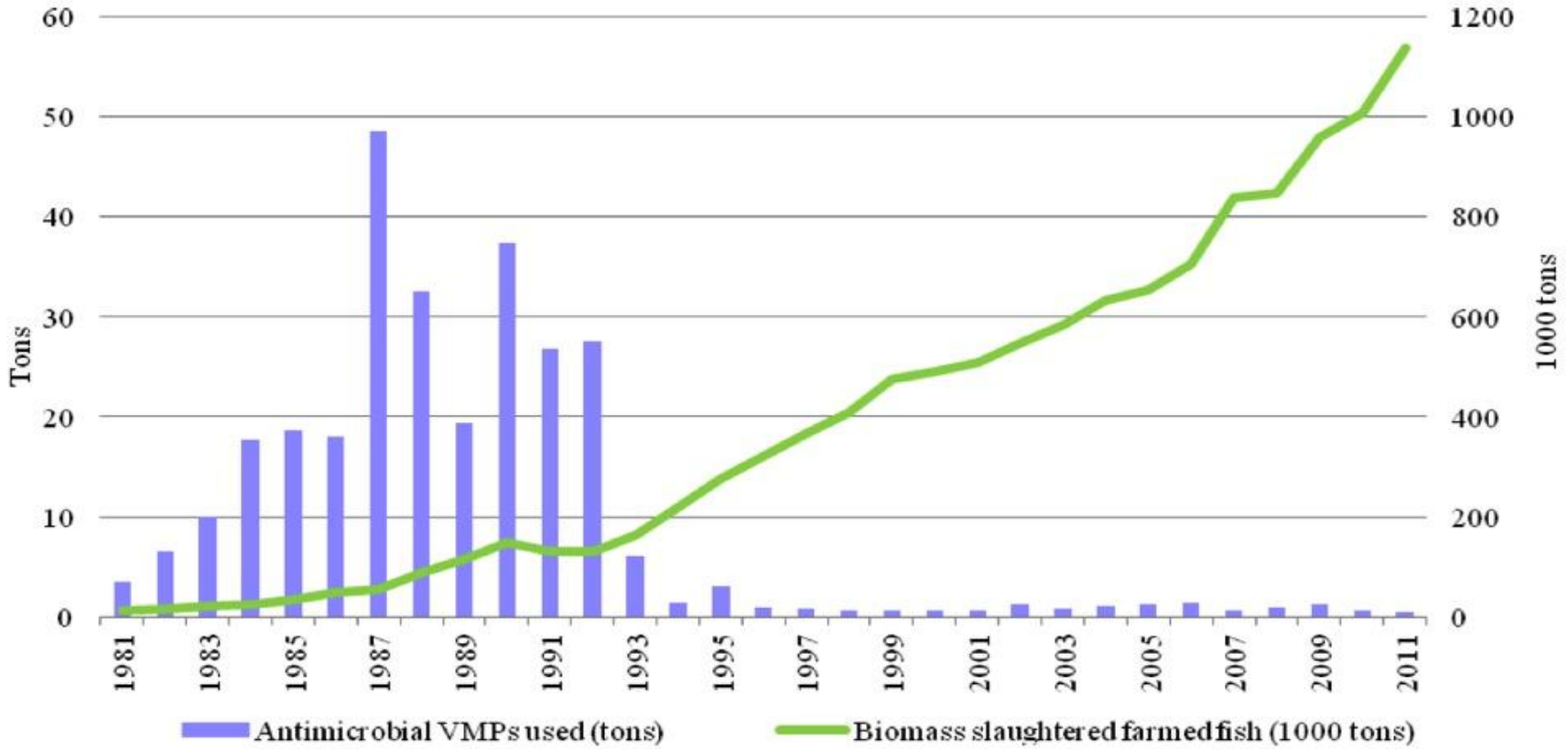
Sustaining Aquaculture Growth

- **For Asia:**
  - Sustainable intensification
- **For Africa:**
  - Policy and governance
- **For Latin America:**
  - Sustainable expansion

Sustaining Aquaculture Growth

- **Improved technology and new innovations are required for:**
  - Genetics
  - Disease management and biosecurity
  - Fishmeal and fish oil replacements
  - Improving FCR
  - Reducing carbon emission
  - Increasing the use of renewable energy
  - Many more!

Sustaining Aquaculture Growth

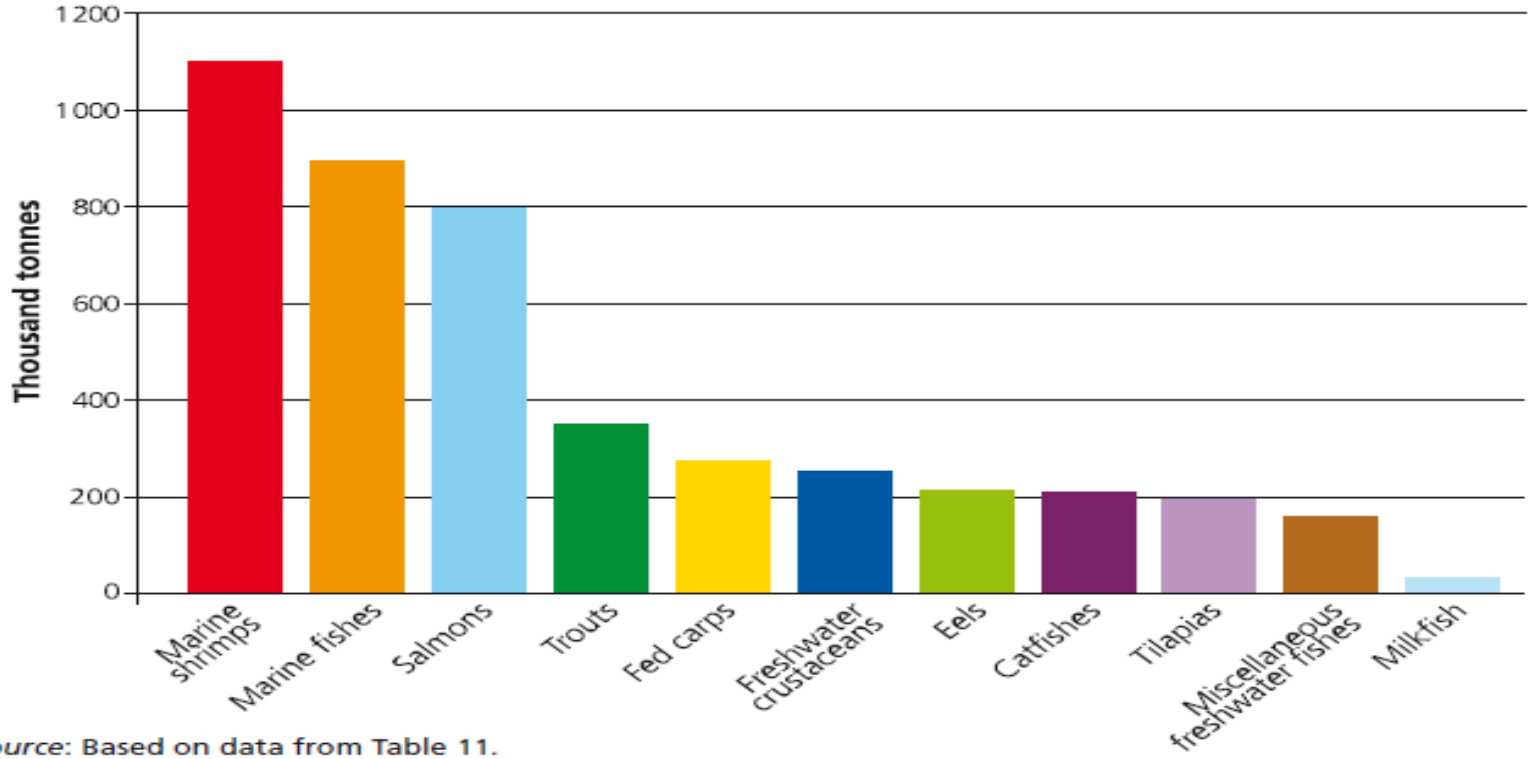


Sustaining Aquaculture Growth

Biosecurity!

Sustaining Aquaculture Growth

FIGURE 38
Estimated total global consumption of fishmeal and fish oil by major aquaculture species group, 2008



Source: Based on data from Table 11.

Sustaining Aquaculture Growth

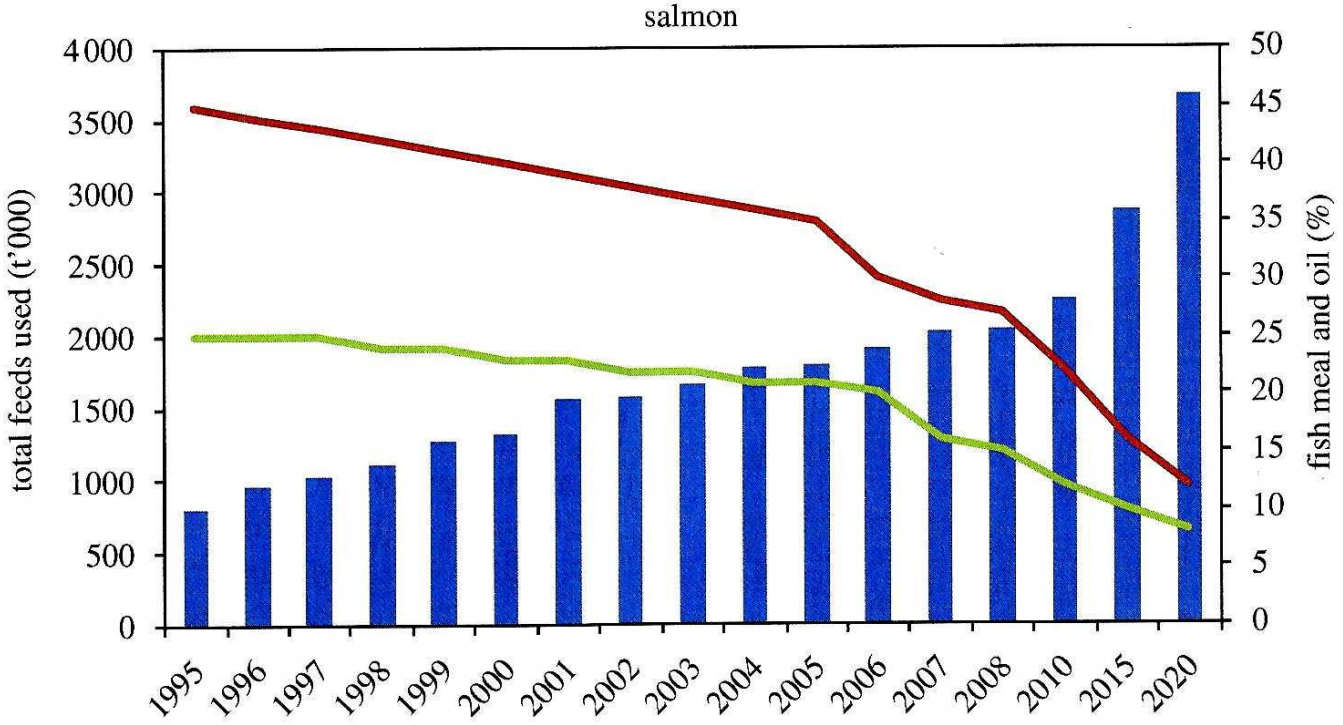
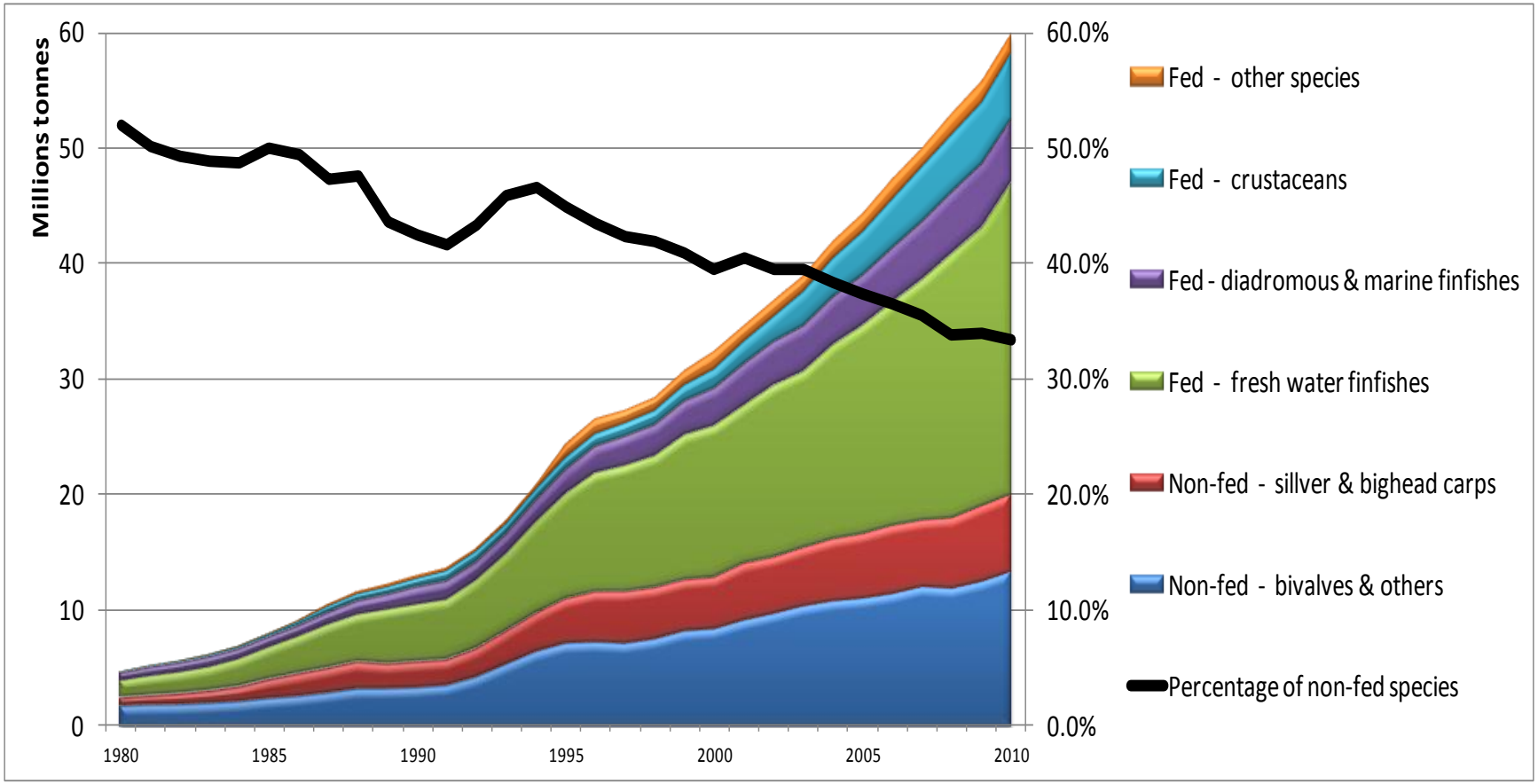
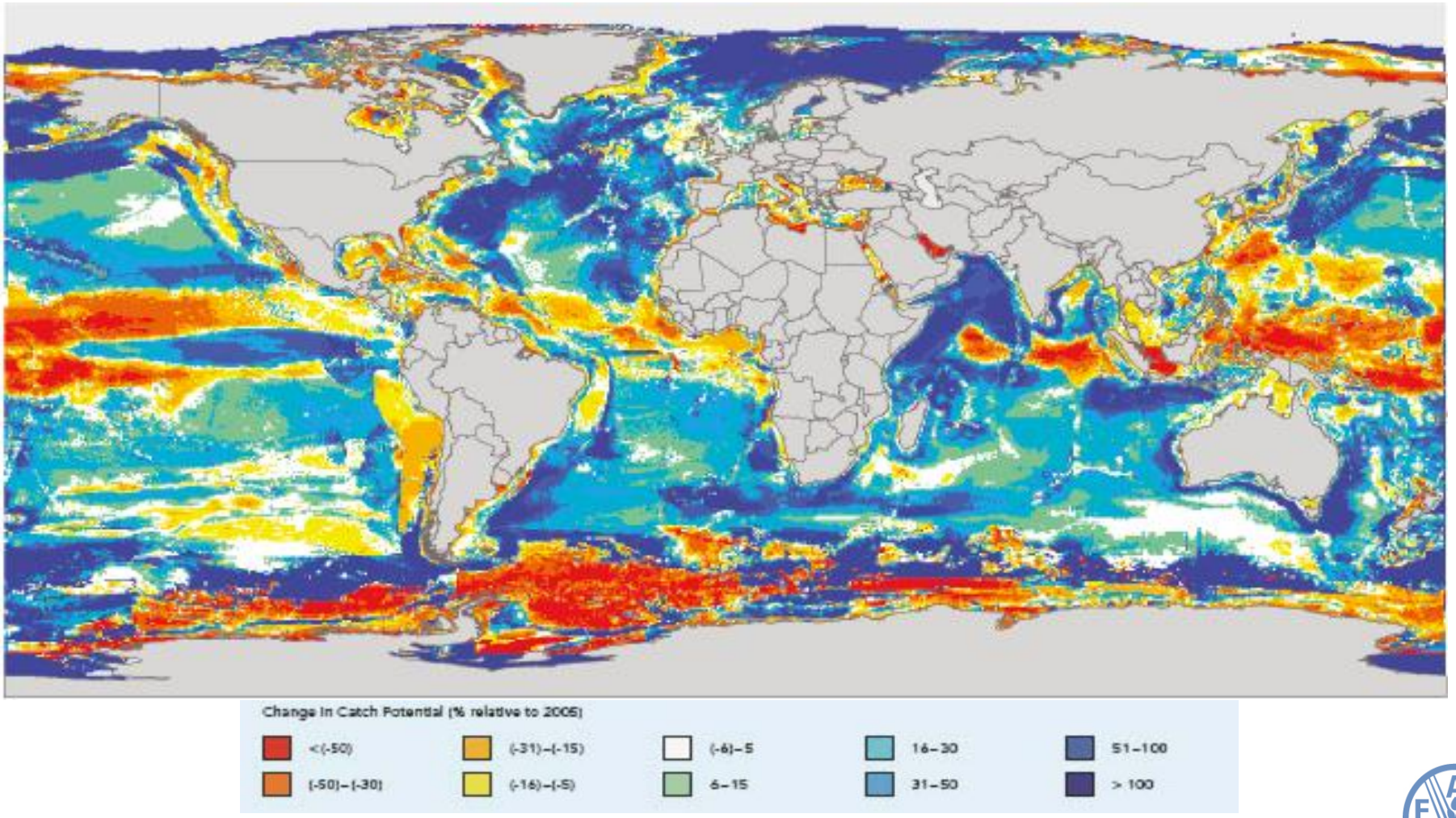


Figure 12. Estimated global use of fish meal and oil by the salmon farming industry projected to 2020. Blue, total feeds used; red, mean % fish meal; green, mean % fish oil. Source: Tacon & Metian (in preparation).

Sustaining Aquaculture Growth



Climate Change Impacts

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Reducing Waste

- 25% of fishmeal is now produced using fish processing waste
- Zero waste concept is now being applied in several aquaculture species
- Future prospects are looking good!

Future

- A serious concerted effort by all parties is necessary to increase the rate of growth of aquaculture sector!
- This effort should focus on sustainable growth and intensification of aquaculture, while improving the social and environmental performance of the sector!
- We need strong political will, good governance and significant investment!

Thank You!